CLAIMS

1.   A method for modulating Nod1 activity wherein said method comprises the steps of:

(a) expressing a functional Nod1 in a eukaryotic cell; and

(b) bringing said cell into contact with a molecule related to MTP.

2.   The method of claim 1 wherein Nod1 activity is increased and the molecule related to MTP is a molecule having an agonist activity compared to the activity of MTP on Nod1.

3.   The method of claim 2, wherein the molecule related to MTP is the tripeptide L-Ala-D-Glu-mesoDap, a biologically active derivative thereof, or a peptidomimetic thereof.

4.   The method of claim 2, wherein the molecule related to MTP is MTP, a biological derivative thereof, or a peptidomimetic thereof.

5.   The method of claim 1 wherein Nod1 activity is decreased and the molecule related to MTP is a molecule which activity is antagonist to MTP on Nod1.

6.   A method for modulating inflammation and/or apoptosis in a mammal, wherein said method comprises administering a molecule related to MTP to said mammal.

7.   The method of claim 6, wherein inflammation and/or apoptosis is increased and the molecule related to MTP is a molecule which activity is agonist to the activity of MTP on Nod1.

8.   The method of claim 6, wherein inflammation and/or apoptosis is decreased and the molecule related to MTP is a molecule which activity is antagonist to the activity of MTP on Nod1.

9.   A composition, which comprises a biologically acceptable carrier and a biologically effective amount of a molecule related to MTP.

10   A compound, which is a tripeptide having the structure L-Ala-D-Glu-mesoDAP, or a biological derivative or a peptidomimetic thereof.

11.   A compound for increasing in vivo inflammation and/or apoptosis or useful as an adjuvant agent in eukaryotes, wherein said compound is a tripeptide having the structure L-Ala-D-Glu-mesoDAP, or a biological derivative or a peptidomimetic thereof, and wherein when said compound is used as an adjuvant agent, the amino acid Ala of said tripeptide is not linked to a N-acylmuramic acid.

12.   The molecule of claim 11 for use as an adjuvant.

13.   A composition, which comprises an antigen and a biologically effective amount of the molecule of claim 12.

14.   A composition, which comprises an immunogen and a biologically effective amount of the molecule of claim 12.

15.   A method for enhancing the immune response of a host, which comprises administering to a host an antigen or a product of interest capable of inducing an immune response by the host, associated with a composition which contains a biologically acceptable carrier and the compound of claim 10 in an amount sufficient to enhance the said immune response.

16.   A method for providing an immune response in a host, which comprises administering an amount effective to promote an immune response of the composition of claim 13.

17.   A immunogenic composition against a bacterial pathogen containing an antigen of interest and the molecule of claim 12 in an amount effective to enhance the effect of the immunogenic composition.

18.   A method of vaccination of a human or an animal host, which comprises administering to that host an amount effective, for vaccination, of the immunogenic composition of claim 17.

19.   The method of claim 16, wherein the host is human or a warm-blood animal.

20.   A method for detecting the dysfunction of a molecule of the inflammatory and/or apoptosis pathway in which Nod1 is involved wherein said method comprises the steps of:

(a)   providing a cell in which the dysfunction of a molecule of the inflammatory and/or apoptosis pathway in which Nod1 is involved, is suspected,

(b)   bringing said cell into contact with MTP or an agonist thereof,

(c)   evaluating NF-κB activation or IL-8 production,

wherein an altered activation of NF-κB or an altered production of IL-8 is indicative of a dysfunction of a molecule of the inflammatory and/or apoptosis pathway in which Nod1 is involved.

21.   A method for screening a molecule which is capable of modulating an inflammatory and/or apoptotic response obtained after direct or indirect interaction between Nod1 and MTP, wherein said method comprises the steps of:

(a)   providing a cell expressing a functional Nod1;

(b)   bringing said cell into contact with the molecule to be tested;

(c)   measuring the activation of NF-κB and/or the production of IL-8; and optionally;

(d)   comparing the result of step c) with a result obtained in absence of the molecule to be tested;

wherein the altered NF-κB activation and/or IL-8 production compared to NF-κB activation and/or IL-8 production in the absence of the molecule to be tested is indicative of the capability of the tested molecule to modulate an inflammatory response resulting from the infection of a mammal a Gram-negative bacteria.

22.   A molecule identified by the screening process of claim 21.

23.   A method for the modulation of inflammation and/or apoptosis in a mammal, comprising the step of administering a molecule identified by the screening process to said mammal.

24.   A peptidic complex containing Nod1 and MTP or a derivative or a peptidomimetic thereof.

25.   The composition of claim 9 for preventing or treating a Gram-negative bacteria infection.

26.   A method for the detection of peptidoglycan from a Gram-negative bacteria in a sample, wherein the method comprises:

a)   providing a sample in which peptidoglycan is to be detected;

b)   bringing said sample into contact with Nod1 protein;

c)   detecting an interaction between MTP and Nod1;

wherein an interaction between MTP and Nod1 is indicative of the presence of peptidoglycan from Gram-negative bacteria in the sample.

27.   The method of claim 26, wherein interaction between MTP and Nod1 is detected by measuring NF-κB activation.

28.   The method of claim 26, wherein interaction between MTP and Nod1 is detected by a bioluminescent signal.

29.   The method of claim 28, wherein said bioluminescent signal is obtained by means of FRET technology.

30.   A method for the detection of peptidoglycan in a sample and optionally determining the Gram-negative or Gram-positive bacteria origin of said peptidoglycan, wherein the method comprises:

a)   providing a sample in which peptidoglycan is to be detected;

b)   bringing said sample into contact with Nod1 protein and with Nod2 protein;

     c)   detecting an interaction between MTP and MDP and at least one of the two Nod proteins, and optionally;

     d)   distinguishing between the interaction with Nod1 from the interaction with Nod2;

wherein an interaction with at least one of the two Nod proteins in c) is indicative of the presence of peptidoglycan in the sample and wherein an interaction with only Nod2 in d) is indicative of a peptidoglycan of Gram-positive bacteria origin in the sample while an interaction with Nod1 and Nod2 is indicative of a peptidoglycan of Gram-negative origin in the sample.

31.   The method of claim 30, wherein interaction between MTP or MDP and Nod proteins is detected by measuring NF-κB activation.

32.   The method of claim 30, wherein interaction between MTP or MDP with Nod proteins is detected by a bioluminescent signal.

33.   The method of claim 32, wherein said bioluminescent signal is obtained by means of FRET technology.

34.   A method for screening a molecule that modulates interaction between Gram-negative bacteria peptidoglycan and Nod1, wherein said method comprises:

     a)   providing MTP;

     b)   bringing said MTP into contact with Nod 1 protein in the presence and in the absence of the tested molecule;

     c)   evaluating the interaction between MTP and Nod1 in the presence and in the absence of the tested molecule;

wherein a modulation of the interaction between MTP and Nod1 in the presence of the tested molecule indicates that said molecule modulates said interaction between Nod1 and Gram-negative bacteria peptidoglycan.